What is claimed is:

1. An interference cancellation system for use in conjunction with a base station having a main antenna for receiving signals from a plurality of remote users, wherein at least one interference source is known, the system comprising:

at least one directional antenna directed toward said at least one interference source, said antenna having a plurality of coplanar feeds that are located one quarter to one half wavelength apart from each other, each coplanar feed for receiving an RF signal;

means for weighting said RF signals received by said plurality of coplanar feeds to produce a cancellation signal;

first summing means for summing said weighted signals using a least mean square (LMS) algorithm; and

second summing means for summing said cancellation signal with signals received from said main antenna to produce an output signal substantially free from interference.

2. The system of claim 1 wherein said weighting is performed using a predetermined factor α.

3. The system of claim 2 wherein each said user is located within the narrow beam path of the directional antenna, and each antenna gain of remote user communicating with said base station is greater than $1/(1 - \alpha)$ relative to the main antenna..

4. The system of claim 1, wherein said output signal is demodulated by an RF receiver to produce a baseband signal, said receiver being coupled to a plurality of modems for phase correction of said baseband signal.

5. The system of claim 4, whereby each of said modems comprises:

means for producing a digital signal by quantizing the baseband signal, said digital signal comprising a data signal and a pilot signal;

means for deriving filter coefficients based on phase error due to RF carrier offset of the data signal;

means for compensating for channel distortion due to multipath effects;

means for determining bit error rate; and

means for automatic power control responsive to the bit error rate.

6. The system of claim 4, wherein each said modem comprises:

an A/D converter coupled to a tracker;

a vector correlator coupled to the output of the A/D converter;

a carrier recovery phase-locked loop unit coupled to the vector correlator for producing filter coefficients in conjunction with the vector correlator;

an adaptive matched filter (AMF) with an input coupled to the A/D converter and the vector correlator and an output coupled to the tracker;

a plurality of channel despreaders coupled to the AMF output;

a Viterbi decoder coupled to the output of said plurality of channel despreaders; and

an automatic power control (APC) unit coupled to the Viterbi decoder.

7. A method for interference cancellation for use in conjunction with a base station having a main antenna for receiving signals from a plurality of remote users, wherein at least one interference source is known, comprising the steps of:

directing at least one directional antenna toward said at least one interference source, each directional antenna having a plurality coplanar feeds that are located one quarter to one half wavelength apart from each other, each coplaner feed for receiving an RF signal; and

canceling an interference signal generated by said at least one known interference source.

8. The method of claim 7 wherein said cancelling step comprises:

weighting the RF signals received by said coplanar feeds;

summing the weighted signals using a least mean square (LMS) algorithm to produce a cancellation signal;

summing the cancellation signal with signals received from the main antenna to produce an output signal substantially free from interference; and

comparing feedback from the output signal to the weighted signal until steady state is achieved.